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EXAMINER

STAICOVICI, S

ART UNIT	PAPER NUMBER
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1732

DATE MAILED: 12/19/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
09/082,309

Applicant(s)
Andreas Walder

Examiner
Stefan Staicovici, Ph.D.

Group Art Unit
1732



☒ Responsive to communication(s) filed on Oct 6, 2000

☒ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 35 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire three month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claim

☒ Claim(s) 16-26, 28, and 29 is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 16-26, 28, and 29 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☒ None of the CERTIFIED copies of the priority documents have been received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☐ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

— SEE OFFICE ACTION ON THE FOLLOWING PAGES —

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DETAILED ACTION

Amendment

1. Applicants' amendment filed October 6, 2000 (Paper No. 11) has been entered. Claim 16 has been amended. No claims have been canceled. No claims have been added. Claims 16-26, 28 and 29 are pending in the instant application.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 16-26 and 28-29 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claim 16, line 1, the limitation "which does not use extruders" does not appear to be supported by the original disclosure. Specifically, on page 5, lines 25-27, the original disclosure describes a method for the production of expandable plastics granulate including "a heatable extruder...used as a melting device".

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In claim 16, lines 15-17, the limitation of “wherein *the dispensing of the blowing agent and the retaining of the mixture is carried out in a single apparatus* in which the mixture is acted upon continuously by means of the static mixing elements” (emphasis added) does not appear to have support in the original disclosure. Although the original disclosure does have support for “impregnation of the plastics melt... in a single apparatus”(see page 2, lines 16-17), the original disclosure does not have support for “wherein the dispensing of the blowing agent and the retaining of the mixture is carried out in a single apparatus”, because on page 6, line 21 through page 7, line 6, the original disclosure describes that the step of impregnation, which includes a step of dispersion and a separate step of retention, are performed in a first static mixer (1') and respectively a second static mixer (2') different from said first static mixer (1'), hence not in a single apparatus.

Claims 17-26 and 28-29 are rejected as dependent claims.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 16-17, 19-23, 25 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buckner (US Patent No. 3,751,377) in view of Muirhead et al. (US Patent No. 3,372,215).

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Buckner ('377) teaches the basic claimed process including providing a source of molten resin (31), a source of volatile fluid foaming (blowing) agent (37) and a plurality of interfacial surface generators (32, 33, 34) (static mixers) (see col. 2, lines 44-46). As shown in Figure 2, the source of molten resin, extruder (31) is in operative communication with interfacial surface generator (32) (static mixer) which provides admixing of the blowing agent with the heat plastified polymer to form a gel, hence avoiding segregation (dispensing of the blowing agent and the retaining of the mixture). It should be noted that the volatile fluid foaming (blowing) agent may be added directly to the polymer source at the entry to the first interfacial surface generator (32) or may be added within the interfacial surface generator (see col. 4, lines 67-70), therefore it is submitted that the gel mixture of molten resin and blowing agent is acted upon by a plurality of interfacial surface generators (32, 33, 34) without the use of any extruders. Further, it should be noted that in addition to using extruders, alternative methods are well known in the art for providing a stream of molten polymer. Furthermore, it should be noted that since the gel mixture of molten resin and blowing agent is acted upon in a continuous manner by a plurality of interfacial surface generators, it is submitted that a single apparatus acts upon the mixture in a continuous manner. Therefore, it would have been a mere obvious matter of choice for one of ordinary skill in the art at the time of the invention to employ an alternative process to extrusion for providing a stream of molten polymer in the process of Buckner ('377), due to availability and its well known status in the art. As shown in Figure 2, the process line further includes processing units (33) and (34) to remove heat (cooling)

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from the heat plastified mixture and bring the material to a desired (predetermined) temperature prior to discharge from the die (35).

Regarding claim 16, Buckner ('377) does not teach granulating the cooled mixture. Muirhead *et al.* ('215) teach a process of forming expandable thermoplastic particles by extruding a heat plastified polymeric composition containing an expanding (blowing) agent in filamentary form, immediately cooling the extruded polymer and cutting the extruded and cooled polymer into particles (granules). It would have been obvious for one of ordinary skill in the art at the time of the invention to replace the die (35) in the process of Buckner ('377) with the die head (13), cooling bath (19) and cutter (20) of Muirhead *et al.* ('215) in order to form granulate material due to availability, process versatility and ease of processing. It should be noted that although Buckner ('377) does not directly teach "extensive shearing" while dispersing the blowing agent and "less shearing", with respect to the dispersing step, while retaining the mixture, it is notoriously well known in the art to "extensively" shear the molten resin as the blowing agent is added. Therefore, it would have been obvious for one of ordinary skill in the art at the time of the invention to "extensively" shear the molten resin as the blowing agent is added, hence in essence providing "less shearing", with respect to the dispersing step, while retaining the mixture, in the process of Buckner ('377) as modified by Muirhead *et al.* ('215), in order to uniformly distribute the blowing agent within the molten resin, due to availability and its well known status in the art. Furthermore, it should be noted that a static mixer inherently has a retention time which varies according to its size, hence the static mixer performs both mixing and retaining functions. Also, it should be note that since the volatile fluid

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foaming (blowing) agent may be added within the interfacial surface generator (32) (see col. 4, lines 67-70), and that a static mixer inherently has a retention time, then it is submitted that the dispensing of the blowing agent and the retaining of the mixture is carried out in a single apparatus, specifically interfacial surface generator (32).

In regard to claim 17, Buckner ('377) teaches the use of interfacial surface generators (static mixers) to remove heat (cooling) from the heat plastified mixture and bring the material to a desired (predetermined) temperature prior to discharge from the die.

Specifically regarding claims 19-21, Muirhead *et al.* ('215) teach a process of forming expandable thermoplastic particles by extruding a heat plastified polymeric composition containing an expanding (blowing) agent in filamentary form, immediately cooling the extruded polymer in a water bath and cutting (disintegration) the extruded and cooled polymeric filament into particles (granules). It would have been obvious for one of ordinary skill in the art at the time of the invention to replace the die (35) in the process of Buckner ('377) with the die head (13), cooling bath (19) and cutter (20) of Muirhead *et al.* ('215) in order to form granulate material due to availability, process versatility and ease of processing.

Regarding claim 22, Buckner ('377) teaches the use of additives with the thermoplastic melt.

In regard to claims 23 and 25, Buckner ('377) teaches that the choice of an interfacial surface generator (static mixer) is to be made with regard to the pressure drop occurring during viscous flow of the material within the flow line. Further, it is well known in the art that as material flows along a fluid transmission line a pressure drop occurs. It would have been obvious for one of ordinary skill

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in the art at the time of the invention to use routine experimentation to control the pressure drop throughout the flow line in the process of Buckner ('377) as modified by Muirhead *et al.* ('215) in order to control the density of the resulting product and hence improve product quality.

Specifically regarding claim 28, Buckner ('377) teaches that fluid foaming (blowing) agent is added directly to the polymer source at the entry to or within the first interfacial surface generator (static mixer) (32), as shown in Figure 2. Hence, dispersing of the foaming (blowing) agent occurs in a first static mixer, while retaining and cooling of the resulting mixture is subsequently performed in static mixers (33) and (34).

6. Claims 18 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buckner (US Patent No. 3,751,377) in view of Muirhead *et al.* (US Patent No. 3,372,215) and in further view of Muller *et al.* (US Patent No. 4,314,606).

Buckner ('377) in view Muirhead *et al.* ('215) teach the basic claimed process as described above. Buckner ('377) as modified by Muirhead *et al.* ('215) do not teach cooling in a static mixer having elements crossing each other and formed as heat exchanging pipes. Muller *et al.* ('606) teach an apparatus suitable for providing any fluid media (melt, paste, dough), heat exchange (heating and cooling) and mixing, including a series of pipes (2) as shown in Figure 1. It would have been obvious for one of ordinary skill in the art at the time of the invention to use the apparatus of Muller *et al.* ('606) in the process of Buckner ('377) as modified by Muirhead *et al.* ('215) in order to reduce processing time by simultaneously mixing and cooling the extruded material, hence increasing productivity and lowering production costs.

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7. Claims 24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buckner (US Patent No. 3,751,377) in view of Muirhead et al. (US Patent No. 3,372,215) and in further view of Suh (EP 0 445 847 A3).

Buckner ('377) in view Muirhead *et al.* ('215) teach the basic claimed process as described above. Buckner ('377) as modified by Muirhead *et al.* ('215) do not teach selectively increasing the pressure of the melt as it travels from the dispersing stage to the retaining stage and then to the cooling stage. Suh (EP 0 445 847 A3) teaches a process whereas the pressure is monitored throughout the flow line and its drift downwards (decrease) is corrected, hence in effect increasing the pressure, by reducing the temperature (hence increasing the viscosity), closing a throttle valve located between a mixer and a die and increasing the feed rate (page 3, lines 54-58). It would have been obvious for one of ordinary skill in the art at the time of the invention to increase the pressure of the thermoplastic melt and foaming (blowing) agent composition as taught by Suh (EP 0 445 847 A3) throughout the flow line in the process of Buckner ('377) as modified by Muirhead *et al.* ('215) in order to have better process control, increase the density of the resulting product and improve process reliability.

Response to Amendment

8. Applicants' amendment filed October 6, 2000 (Paper No. 11) has been fully considered.

Applicants argue that in claim 16, line 1, the limitation of "which does not use extruders" is supported by the original disclosure, because "it is clear that the heatable extruder is disclosed as

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being used as a melting device and this is not the subject matter of the claimed method” and as such, the “subject matter recited in claim 16 is being carried out without the use of extruders” (see page 2 of the amendment filed October 6, 2000). However, the original disclosure describes a process “for the production of expandable plastics granulate from a plastics melt and a fluid blowing agent.” Therefore, it is submitted that the process can not function without the existence of a melt and a fluid blowing agent. Further, the original disclosure specifies a “heatable extruder...used as a melting device” (page 5, lines 25-27). Therefore, since the claimed process requires by definition a melt and, the original disclosure teaches a “heatable extruder...used as a melting device”, it is submitted that the limitation in claim 16, line 1, of “which does not use extruders” is not supported by the original disclosure.

Applicants argue that the art of record does not teach or suggest, either alone or in combination, a method wherein “dispensing of the blowing agent and the retaining of the mixture is carried out in a single apparatus”. However, as shown above, since the volatile fluid foaming (blowing) agent may be added within the interfacial surface generator (32) (see col. 4, lines 67-70), and that a static mixer inherently has a retention time, then it is submitted that the dispensing of the blowing agent and the retaining of the mixture is carried out in a single apparatus, specifically interfacial surface generator (32).

Applicants argue that the art of record does not teach or suggest, either alone or in combination, a method that uses static mixing elements. However, an interfacial surface generator is a static mixer. Further, Buckner (‘377) teaches a process including a plurality of interfacial surface

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generators (32, 33, 34) (see Figure 2), wherein dispensing of the blowing agent and retaining of the mixture occurs in a single apparatus, interfacial surface generator (32) (static mixer).

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stefan Staicovici, Ph.D. whose telephone number is (703) 305-0396. The examiner can normally be reached on Monday-Friday 8:00 AM to 5:30 PM, alternate Fridays off.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jan H. Silbaugh, can be reached at (703) 308-3829. The fax phone number for this Group is (703) 305-7718.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0661.

December 17, 2000



Stefan Staicovici, PhD


JAN H. SILBAUGH
SUPERVISORY PATENT EXAMINER
ART UNIT 1732

12/18/00